Problem CD 8:

TRIM LOSS: The cleveland Sprinkler Company buys ¾ inch Schedule 40 PVC pipes, which come in 10 foot lengths, and cuts them into the 30 inch, 42 inch and 56 inch lengths it requires for its projects. The following table gives the number of pieces of each on hand and the current requirements for each of the three lengths. Any cut of less than 30 inches is considered waste (trim loss) and is discarded. The company would like to purchase enouhg pipe to satisfy its requirements while minimizing its total trim losses.

	30 Inches	42 Inches	56 Inches
Current Inventory	0	400	150
Required	1500	900	750

Hint: The 10 foot (120 inches) can be cut into several variations (eg four 30 inch lengths, two 30 inch lengths, and one 42 inch length with 18 inch trim loss, one 30 inch lengths and two 42 inch lengths with 6 inches of trim loss etc.). The decision variables are the number of pipes cut into each of these configurations.

Solution:

Pipes:

A: 4*30″ (loss=0″)

B: 2*30″+1*42″ (loss=18″)

C: 2*30″+1*56″ (loss=4″)

D: 1*30″+2*42″ (loss=6″)

E: 1*42″+1*56″ (loss=22″)

F: 2*56″ (loss=8″)

Variables

X_A : Number of A type cutting

X_B : Number of B type cutting

X_C : Number of C type cutting

X_D : Number of D type cutting

X_E : Number of E type cutting

X_F : Number of F type cutting

Model

Minimize: $X_A*0 + X_B*18 + X_C*4 + X_D*6 + X_E*22 + X_F*8$

$X_A*4 + X_B*2 + X_C*2 + X_D*1 + X_E*0 + X_F*0 \geq 1500$ (30″ pipe limit)

$X_A*0 + X_B*1 + X_C*0 + X_D*2 + X_E*1 + X_F*0 \geq 900-400$ (42″ pipe limit)

$X_A*0 + X_B*0 + X_C*1 + X_D*0 + X_E*1 + X_F*2 \geq 750-150$ (56″ pipe limit)

$X_A, X_B, X_C, X_D, X_E, X_F \geq 0$

Note You can see the solution of the problem in the excel sheet g6-s4-cd8.xls with using solver.